

# PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

# PCT

To:

see form PCT/ISA/220

## WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing  
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference  
see form PCT/ISA/220.

**FOR FURTHER ACTION**  
See paragraph 2 below

International application No.  
PCT/IB2005/051049

International filing date (day/month/year)  
29.03.2005

Priority date (day/month/year)  
30.03.2004

International Patent Classification (IPC) or both national classification and IPC  
G02F1/025

Applicant  
ECOLE POLYTECHNIQUE FEDERALE DE LAUSANNE (EPFL)

**1. This opinion contains indications relating to the following items:**

- ☒ Box No. I Basis of the opinion
- ☒ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

**2. FURTHER ACTION**

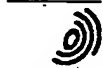
If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

**3. For further details, see notes to Form PCT/ISA/220.**

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WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITYInternational application No.  
PCT/B2005/051049**10/594391****Box No. I Basis of the opinion**

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.  
☐ This opinion has been established on the basis of a translation from the original language into the following language, which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
  - a. type of material:  
☐ a sequence listing  
☐ table(s) related to the sequence listing
  - b. format of material:  
☐ in written format  
☐ in computer readable form
  - c. time of filing/furnishing:  
☐ contained in the international application as filed.  
☐ filed together with the international application in computer readable form.  
☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**Box No. II Priority**

1. ☒ The validity of the priority claim has not been considered because the International Searching Authority does not have in its possession a copy of the earlier application whose priority has been claimed or, where required, a translation of that earlier application. This opinion has nevertheless been established on the assumption that the relevant date (Rules 43bis.1 and 64.1) is the claimed priority date.
2. ☐ This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43bis.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.
3. Additional observations, if necessary:

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/IB2005/051049

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**Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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**1. Statement**

Novelty (N)	Yes: Claims	5,8
	No: Claims	1-4,6,7
Inventive step (IS)	Yes: Claims	
	No: Claims	1-8
Industrial applicability (IA)	Yes: Claims	1-8
	No: Claims	

**2. Citations and explanations**

**see separate sheet**

**Re Item V.**

**1 Reference is made to the following documents:**

D1 : CRISTOLOVEANU S: "Silicon on insulator technologies and devices: from present to future" SOLID STATE ELECTRONICS, ELSEVIER SCIENCE PUBLISHERS, BARKING, GB, vol. 45, no. 8, August 2001 (2001-08), pages 1403-1411, ISSN: 0038-1101

D2 : PARK J-T ET AL: "MULTIPLE-GATE SOI MOSFETS: DEVICE DESIGN GUIDELINES" IEEE TRANSACTIONS ON ELECTRON DEVICES, IEEE INC. NEW YORK, US, vol. 49, no. 12, December 2002 (2002-12), pages 2222-2229, ISSN: 0018-9383

**2 INDEPENDENT CLAIM 1**

**2.1 The subject-matter of independent device claim 1 is not clear (Article 6 PCT) for the following reasons:**

The subject-matter of claim 1 concerns the definition of the structural features of a light phase modulator. It remains unclear from claim 1 whether the "multi-gate transistor" forms part of the modulator or is merely employed to switch the modulator. In addition, the expression "which if scaled in the submicron dimension" cannot be considered as being limiting concerning the scope of the claim. Claim 1 fails to define, in an unambiguous manner, any features responsible for the optical characteristics (in particular that the nanowire is a photonic nanowire into which light is coupled) of the device for which protection is sought.

**2.2 As outlined in point 2.1 above, the subject-matter of claim 1 fails to define any structural features which distinguish the optical device, for which protection is sought, from a multi-gate transistor. In this regard, document D1 discloses a device having a conducting part (see for example Fig. 2(d), GAA MOSFET, gate thereof). The device disclosed in D1 is based on a multi-gate transistor (see for**

example Fig. 2(d), GAA MOSFET, gate-all-around) made from Silicon-On-Insulator or silicon bulk having a rectangular shape (in the submicron scale, see P. 1405, third paragraph). Therefore, the subject-matter of claim 1 (also claims 2-4) is not considered as being novel (Article 33(2) PCT), with respect to the disclosure of document D1 (also document D2). It should be also noted that although in claim 1 the expression "light phase modulator" is employed in claim 1 the device disclosed in D1 (or D2) is suitable for use as an optical modulator without modification. As such the expression "light phase modulator" does not adequately distinguish the device for which protection is sought from the disclosure of D1 (or D2).

### 2.3 DEPENDENT CLAIMS 4-8

Dependent claims 4-8 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step (Article 33(2) and (3) PCT).